CLAIM OR CLAIMS

We claim:

1. An antenna comprising a conductive thermoplastic composition comprising 15 to 70 weight percent conductive fibers dispersed in a structural matrix, wherein said structural matrix comprises at least one thermoplastic structural resin having a dielectric constant of less than 5.0 at 1 kilohertz; provided
(i) when said composition comprises a polyamide resin or an epoxide resin, an additional thermoplastic structural resin must also be present;
(ii) when said composition comprises a polyester resin, an additional thermoplastic structural resin other than an acrylonitrile/styrene/acrylate resin must also be present.

2. The antenna of Claim 1 wherein the conductive thermoplastic composition comprises at least one thermoplastic structural resin having a dielectric constant of less than 3.0 at 1 kilohertz.

3. The antenna of Claim 1 wherein the conductive thermoplastic composition comprises at least one thermoplastic structural resin having a dielectric constant of from 2.0 to 2.8 at 1 kilohertz.

4. The antenna of Claim 1 wherein the conductive thermoplastic composition comprises at least one thermoplastic structural resin selected from the group consisting of polyolefins; polyphenylene oxides; fluorinated polymers; and ionomeric resins.

5. The antenna of Claim 4 wherein the conductive thermoplastic composition comprises an ionomeric resin.

6. The antenna of Claim 5 wherein the conductive thermoplastic composition comprises an ionomeric resin comprising one or more E/X/Y copolymers where E is ethylene, X is derived from a C_3 to C_8 α,β ethylenically unsaturated carboxylic acid, and Y is derived from an alkyl acrylate or an alkyl methacrylate wherein the alkyl groups have from 1 to 8 carbon atoms, and wherein X is present in from 2 to 30 weight % of the E/X/Y copolymer, Y is present from 0 to 40 weight % of the E/X/Y copolymer, and said E/X/Y copolymer has a weight average molecular

weight of from 80,000 to 500,000, and is at least partially neutralized by one or more alkali metal, transition metal, or alkaline earth metal cations.

7. The antenna of Claim 6 wherein said E/X/Y copolymers are ethylene copolymers having from 7 to 20 weight % acrylic acid or methacrylic acid as X and from 0 to 30 weight % alkyl (meth)acrylates as Y.

8. The antenna of Claim 7 wherein said E/X/Y copolymers have from 0 to 15 weight % alkyl (meth)acrylates as Y.

9. The antenna of Claim 7 wherein said E/X/Y copolymers are selected from the group of copolymers consisting of a copolymer of ethylene, 9 weight % methacrylic acid, and 24 weight % n-butyl acrylate with 51% of the carboxylic acid groups neutralized using Zinc(II) cations; a copolymer of ethylene and 15 weight % methacrylic acid with 58% of the carboxylic acid groups neutralized using Zinc(II) cations; a copolymer of ethylene and 9 weight % methacrylic acid with the acid 18% neutralized using Zinc(II) cations; and a copolymer of ethylene and 19 weight % methacrylic acid with 36% of the carboxylic acid groups neutralized using Zinc(II) cations.

10. The antenna of Claim 9 wherein said E/X/Y copolymers are selected from the group of copolymers consisting of a copolymer of ethylene, 9 weight % methacrylic acid, and 24 weight % n-butyl acrylate with the acid 51% neutralized using Zinc(II) cations; a copolymer of ethylene and 15 weight % methacrylic acid with the acid 58% neutralized using Zinc(II) cations; and a copolymer of ethylene and 9 weight % methacrylic acid with the acid 18% neutralized using Zinc(II) cations.

11. The antenna of Claim 7 wherein said E/X/Y copolymer is blended with at least one additional nonionomeric thermoplastic resin selected from the group consisting of polyurethane; polyurea; polyamide; polyester; polycarbonate; polystyrene; acrylics; copoly-ether-ester; copoly-ether-amide; copoly-ether-urethane; copoly-ether-urea; polyolefins; elastomeric polyolefins; polyethylene; polypropylene; ethylene copolymers derived from copolymerization of ethylene and polar comonomers selected from the group consisting of vinyl acetate, alkyl (meth)acrylate, carbon monoxide, and epoxy containing comonomers; maleic anhydride modified

polymers; and thermoplastic elastomers based on styrene-butadiene block copolymers.

12. The antenna of Claim 11 wherein said E/X/Y copolymer is blended with polyethylene containing about 1 weight % maleic anhydride comonomer.

13. The antenna of Claim 4 wherein the conductive thermoplastic composition comprises a polyethylene resin.

14. The antenna of Claim 4 wherein the conductive thermoplastic composition comprises a polypropylene resin.

15. The antenna of any of Claims 1 through 14 wherein the conductive thermoplastic composition comprises stainless steel fibers as the conductive fibers.

16. The antenna of Claim 15 wherein the conductive thermoplastic composition comprises from 18 weight % to 60 weight % stainless steel fibers.

17. The antenna of Claim 16 wherein the conductive thermoplastic composition comprises from 25 weight % to 50 weight % stainless steel fibers.

18. The antenna of Claim 17 wherein the conductive thermoplastic composition comprises from 28 weight % to 42 weight % stainless steel fibers.

19. The antenna of any of Claims 1 through 14 wherein the conductive thermoplastic composition comprises carbon fibers as the conductive fibers.

20. A conductive thermoplastic composition comprising 15 to 70 weight percent conductive fibers dispersed in a structural matrix comprising an ionomeric resin.

21. The conductive thermoplastic composition of Claim 20 wherein the ionomeric resin comprises one or more E/X/Y copolymers where E is ethylene, X is derived from a C_3 to C_8 α,β ethylenically unsaturated carboxylic acid, and Y is derived from an alkyl acrylate or an alkyl methacrylate wherein the alkyl groups have from 1 to 8 carbon atoms, and wherein X is present in from 2 to 30 weight % of the E/X/Y

copolymer, Y is present from 0 to 40 weight % of the E/X/Y copolymer and said E/X/Y copolymer has a weight average molecular weight of from 80,000 to 500,000, and is at least partially neutralized by one or more alkali metal, transition metal, or alkaline earth metal cations.

22. The conductive thermoplastic composition of Claim 21 wherein said E/X/Y copolymers are ethylene copolymers having from 7 to 20 weight % acrylic acid or methacrylic acid as X and from 0 to 30 weight % alkyl (meth)acrylates as Y.

23. The conductive thermoplastic composition of Claim 22 wherein said E/X/Y copolymers have from 0 to 15 weight % alkyl (meth)acrylates as Y.

24. The conductive thermoplastic composition of Claim 21 wherein said E/X/Y copolymers are selected from the group of copolymers consisting of a copolymer of ethylene, 9 weight % methacrylic acid, and 24 weight % n-butyl acrylate with 51% of the carboxylic acid groups neutralized using Zinc(II) cations; a copolymer of ethylene and 15 weight % methacrylic acid with 58% of the carboxylic acid groups neutralized using Zinc(II) cations; a copolymer of ethylene and 9 weight % methacrylic acid with the acid 18% neutralized using Zinc(II) cations; and a copolymer of ethylene and 19 weight % methacrylic acid with 36% of the carboxylic acid groups neutralized using Zinc(II) cations.

25. The conductive thermoplastic composition of Claim 24 wherein said E/X/Y copolymers are selected from the group of copolymers consisting of a copolymer of ethylene, 9 weight % methacrylic acid, and 24 weight % n-butyl acrylate with the acid 51% neutralized using Zinc(II) cations; a copolymer of ethylene and 15 weight % methacrylic acid with the acid 58% neutralized using Zinc(II) cations; and a copolymer of ethylene and 9 weight % methacrylic acid with the acid 18% neutralized using Zinc(II) cations.

26. The conductive thermoplastic composition of any of Claims 20 through 25 wherein the conductive thermoplastic composition comprises stainless steel fibers as the conductive fibers.

27. The conductive thermoplastic composition of Claim 26 wherein the conductive thermoplastic composition comprises from 18 weight % to 60 weight % stainless steel fibers.

28. The conductive thermoplastic composition of Claim 27 wherein the conductive thermoplastic composition comprises from 25 weight % to 50 weight % stainless steel fibers.

29. The conductive thermoplastic composition of Claim 28 wherein the conductive thermoplastic composition comprises from 28 weight % to 42 weight % stainless steel fibers.

30. A conductive thermoplastic composition comprising 15 to 70 weight percent conductive fibers dispersed in a structural matrix comprising a polyolefin resin.

31. The conductive thermoplastic composition of Claim 30 wherein the conductive thermoplastic composition comprises a structural matrix comprising a polyethylene resin.

32. The conductive thermoplastic composition of Claim 31 wherein the conductive thermoplastic composition comprises from 18 weight % to 60 weight % stainless steel fibers.

33. The conductive thermoplastic composition of Claim 30 wherein the conductive thermoplastic composition comprises a structural matrix comprising a polypropylene resin.

34. The conductive thermoplastic composition of Claim 33 wherein the conductive thermoplastic composition comprises from 18 weight % to 60 weight % stainless steel fibers.

35. A method of fabricating an antenna comprising:

(a) dispersing from 15 to 70 weight percent conductive fibers in a structural matrix comprising at least one thermoplastic structural resin having a dielectric constant of less than 5.0 at 1 kilohertz to form a conductive thermoplastic composition;

(b) forming said conductive thermoplastic composition into the desired shape for an antenna; provided

(i) when said composition comprises a polyamide resin or an epoxide resin, an additional thermoplastic structural resin must also be present;

(ii) when said composition comprises a polyester resin, an additional thermoplastic structural resin other than an acrylonitrile/styrene/acrylate resin must also be present.

36. The method of Claim 35 wherein the structural matrix comprises at least one thermoplastic structural resin having a dielectric constant of less than 3.0 at 1 kilohertz.

37. In an antenna element comprising a structural matrix containing dispersed conductive fibers, wherein the improvement comprises using as said structural matrix an ionomeric resin comprising one or more E/X/Y copolymers where E is ethylene, X is derived from a C_3 to C_8 α,β ethylenically unsaturated carboxylic acid, and Y is derived from an alkyl acrylate or an alkyl methacrylate wherein the alkyl groups have from 1 to 8 carbon atoms, and wherein X is present in from 2 to 30 weight % of the E/X/Y copolymer, Y is present from 0 to 40 weight % of the E/X/Y copolymer and said E/X/Y copolymer has a weight average molecular weight of from 80,000 to 500,000, and is at least partially neutralized by one or more alkali metal, transition metal, or alkaline earth metal cations.